PUSH METHOD AND SYSTEM

FIELD OF INVENTION

The present invention relates generally to a method
5   and a computer terminal for obtaining a real push
function in a communication system, such as a system
for broadcasting of digital video information.

BACKGROUND

Interactive television systems capable of two-way com-
10   munication between computer systems operating as
information service providers, in particular Internet
service providers, and networked Integrated Receiver
Decoders (IRDs) are becoming increasingly popular.
Such systems open up for new services and features for
15   television users. A standard developed by the Project
on Digital Video Broadcasting is the so-called Digital
Video Broadcasting standard or simply DVB standard.
Its main intent is to reap the benefits of technical
standardization. For more information regarding the
20   DVB standard, reference is made to the publication
"Digital Television MPEG 1 MPEG 2 And principles of
the DVB System", H Benoit, ISBN 0-471-23810-4, or to
the DVB Home Page on the Internet: http://www.dvb.org.

An alternative to cable and analogue satellite recep-
25   tion is to utilize a fixed dish focused on one or more
geostationary satellites. Digital broadcast system
(DBS) units are able to receive multiple channels of
multiplexed video and audio signals as well as pro-
gramming information, E-mail, and related data. DBS
30   typically uses MPEG-2 encoding and COFDM transmission.

Internet access is based on the idea that the users access the desired web sites and retrieve the information needed. However, if the information needed is unavailable, a user has to access the web site again to

5   retrieve the information at a later time. This procedure is repeated until the requested information is available. Thus, a drawback is that the Internet does not support a function that sends the information automatically to the user once it is available.

10   There have recently been some attempt to create a fake "push" mechanism based on polling by the client but this approach is not even suitable for conventional type of Internet access and therefore even more inappropriate for broadcasting.

15   Another known solution is to have a "Demon" listening to a specific http address, checking whether a change has been made and retrieving new information, such as new e-mail. This solution means unnecessary loading of the system.

20   Yet another known solution has been implemented in the ATVEF standard (ATVEF — Advanced Television Enhancement Forum). According to ATVEF, it is possible, in a digital network, to send URLs and content to a terminal, such as a set top box. However,

25   ATVEF uses a purely IP based mechanism not using audio and video information or the synchronization thereof. Because of that, in order to use the ATVEF push mechanism, special equipment is needed, such as new head-end equipment on the Service Provider side and

30   additional software components on the receiver side.

Also, a proper and working synchronization mechanism is lacking in the ATVEF solution. As an example, it is not possible to send a bit map together with text information and be sure that the information is

5   presented at exactly the right time. Also, it is not possible to launch an application with the ATVEF function; it is simply a link to a home page. This is described in the international patent application PCT/US97/18664 (WO9817064) in the name of Gemstar

10   Development Corporation.

SUMMARY OF THE INVENTION

An object of the present invention is to overcome the problems associated with prior art and to provide a real push mechanism in a digital communication system.

15   The invention is based on the realization that the backbone of the DVB or DBS, such as Multiprotocol Encapsulation and subtitling, can be used to create a real push mechanism so that the client application is notified of the availability of the requested informa-

20   tion without the need for polling.

According to the invention there is provided a method for creating a push mechanism in a digital communica- tion system according to claim 1 and a system for carrying out the method according to claim 14. There

25   is also provided a computer terminal as defined in claim 12, a computer program product directly loadable into the internal memory of a digital computer as defined in claim 15 and a computer program product stored on a computer readable storage medium as

30   defined in claim 16.

With the invention, both synchronization and inter-
action are achieved in a communication system, such as
a system complying with the DVB standard.

BRIEF DESCRIPTION OF DRAWINGS

5   The invention is now described, by way of example,
with reference to the accompanying drawings, in which:

FIG. 1 is conceptual model of a DVB (MPEG-2) baseband
processor used for transmitting information,

FIG. 2 is an overall diagram of a communication system
10   embodying the invention, and

FIG. 3 is conceptual model of a DVB (MPEG-2) baseband
processor used for receiving information.

DETAILED DESCRIPTION OF THE INVENTION

In the following, a detailed description of a pre-
15   ferred embodiment of the invention will be given.
Because the invention mainly relates to the DVB
standard, the nomenclature used in this description is
adapted to the DVB. Thus, in the following, a
"service" is equivalent to a "television channel" or a
20   "radio channel", for example. Similarly, an "event" is
equivalent to a traditional "television programme" or
"radio programme".

Reference is first made to figure 1, which is a con-
ceptual model of a DVB (MPEG-2) transmitting baseband
25   processor, generally designated 10. In the present
example, the transmitting processor 10 is located at a
so-called Service Provider, i.e., a party providing
services like TV channels. As can be seen from the

figure, the input to the processor consists mainly of
a number of program sources 12. Each programme source
comprises any mixture of raw data and uncompressed
video and audio, where the data can be, for example,

5   teletext and/or subtitling information and graphical
information such as logos. Each of the video, audio
and programme-related data inputs is encoded by means
of a respective encoder 14V, 14A, and 14D, and
formatted into a Packetized Elementary Stream (PES) by

10   means of a respective packetizer 16V, 16A, and 16D.
Thus, each PES is a digitally encoded component of a
programme. The input data comes from user equipment,
such as cameras for digital video recording, sound
equipment for audio and a computer for processing

15   digital data.

The simplest type of service is a radio channel, which
would consist of a single audio elementary stream. A
traditional television broadcast would comprise three
elementary streams: one carrying coded video, one

20   carrying coded stereo audio and one carrying teletext.

Following packetization, the various elementary
streams of a programme are multiplexed with packetized
elementary streams from other programmes by means of a
Transport Multiplexer 18 to form a Transport Stream

25   (TS).

Each of the Packetized Elementary Streams can carry
timing information, or "time stamps", to ensure that
related elementary streams are replayed in synchronism
in the decoder. Programmes can each have a different

30   reference clock, or can share a common clock, refer-

enced 20. Samples of each "Programme Clock", called
Programme Clock References (PCRs), are inserted into
the Transport Stream to enable the decoder to
synchronize its clock to that in the multiplexer 18.

5   Once synchronized, the decoder can correctly interpret
the time stamps and can determine the appropriate time
to decode and present the associated information to
the user.

Additional data 22 is inserted into the Transport

10   Stream, which includes Programme Specific Information
(PSI) 24, Service Information (SI) 26, Conditional
Access (CA) data 28 and Private data 30, see figure 1.
Private data is a data stream, the content of which is
not specified by the standard and can be used freely.

15   The backbone of the system will now be briefly dis-
cussed with reference to figure 2. The backbone com-
prises a number of communication paths 30, one of
which is shown in figure 2. The transmission medium
supports high-speed transmission of digital infor-

20   mation, such as audio (A), video (V) and data (D). A
number of users, such as the baseband processor 10
shown in figure 1, are connected to the backbone. In
the present example, a first baseband processor user
10 functions as a transmitter of information and a

25   second user 40 as a receiver of information.

A method covered by a standard, such as MPE, Multi-
protocol Encapsulation, is used to send the infor-
mation to the receiver 40 through receiver equipment,
which will now be discussed with reference to figure

30   3. The transport stream arriving from the transmission

medium is first demultiplexed in a Transport
Demultiplexer 42, splitting the information into
several programme streams comprising related
elementary streams, four of which are shown as an
5   example. The exemplary streams comprise a video stream
V1, an audio stream A1 and two data streams D1.1,
D1.2. This information results in a TV programme, for
example.

The video and audio streams are directed to a video
10   and audio decoder 44, wherein the signals are decoded.
The decoded audio and video signals are synchronized
in the decoder 44 by means of the PTS. This
synchronization is carried out in hardware.

The decoded signals are input to a digital to analogue
15   (D/A) converter 46, wherein the digital information is
converted to analogue form useable by a TV encoder,
such as a PAL encoder 48. The encoder 48 supplies the
encoded information to a presentation unit, in this
case a TV set 60, on which the information is dis-
20   played.

The data information can comprise several kinds of
information. An example thereof is DVB subtitling
information. This information can be in the form of
text or bit maps etc. and is therefore suitable for
25   use with the present invention. The subtitling infor-
mation includes presentation information in order to
synchronize it with audio and video information and is
sent in a special way in the PES packets. The actual
data, or in other words the content (sent by e.g. MPE)
30   can be buffered in the decoder until the presentation

time, which can be e.g. 10 minutes later or more.
There is also a Decode time stamp (DTS) indicating
when the information is to be decoded. The
synchronization also applies to data application, such

5   as a browser 80.

In order to keep track of time, the receiver 40 also
comprises a clock reference 50. This clock is adjusted
in accordance with timing signals sent by the
transmitting processor 10, e.g., the Service Provider.

10 The time values of the clock 50 correspond to the PTS
values of the incoming information. Thus, if the clock
50 has the value "100" and the PTS of the incoming
information is "150", there is a delay of 50 time
periods until the incoming information is presented. A

15 signal is then sent from a monitoring module to the
application when an event is to be started. As already
mentioned, the audio and video information is
synchronized automatically in the decoder 44.

Thus, the receiver software uses the time stamps to

20 synchronize the presentation of an announcement with
video/audio and present it to the user at exact the
right moment. Different methods are available for the
client software to present the announcement to the
user in a very satisfactory way. As an example,

25 bitmaps for the presentation of an announcement, like
an icon on the screen, can be sent together with it,
whereby exact positioning of the icon can be achieved.
In addition, different effects, such as animations,
can be obtained by direct control of the broadcaster.

30 Alternatively, simple audio effects may be achieved.

Another kind of data is the unsynchronized Service Information (SI). This information is sent in the transport stream from where it is extracted.

Data synchronization information is received through
5 another data channel, in the present example D1.2. This information is supplied to an application 70, e.g. a DVB subtitling application. DVB subtitling is a broadcaster using PES packets. By means of this function, exact frame synchronization may be achieved.

10 A simplified version of the DVB subtitling is used to send an announcement of content availability to the user.

Hence, the concept requires transmission of two types of data. The first one is the content sent by the
15 means of e.g. MPE. The content can be web page in Hypertext Markup Language (HTML) format, a complete executable application or some input to an already resident application in the receiver, etc. The second data type to be transmitted is the so-called triggers
20 announcing the availability of the content or automatically starting the execution of it.

The push application according to the invention will now be described in more detail. The subtitling appli- cation according to DVB is not used. However, the
25 transfer mechanism used by the subtitling is used.

First, a bitmap is defined together with associated data, such as reference to the content (like URL), some option executable code and presentation position on a screen etc. Thus, it is a graphical element as

such without any special restrictions. Thus, what are used from the DVB standard are the time stamp, positioning and graphics.

During an event, e.g. when an icon is shown on a TV
5 screen during a particular TV show, a pure software application can be launched by selecting the icon on the screen. This selection triggers an event that in turn activates another application.

Thus, the receiver should contain an application moni-
10 toring the arrival of triggers. By analyzing the content of the trigger, this application will know when the trigger should be launched. Once the PTS of the current DVB stream matches the launch time of the trigger, it will be invoked by this application. The
15 invocation of the trigger may result in URL (previously cached from the MPE stream) being presented in a browser context or an executable application being started (also cached from the MPE) or the trigger data being passed to an already existing application (e.g.
20 using MIME types or similar mechanisms).

The launched application can be any application, such as the web browser 80. In that case, the event triggers the browser by means of a URL. An other example is to invoke a resident software application
25 which starts to retrieve software update information from the Service Provider and install new components if they are available (some kind of smart update). Alternatively, a chat programme can be started with a topic connected to the TV programme currently shown.

Another alternative is to show an icon on the screen of the TV set 60 during a short time interval, e.g., one second. If the viewer manages to select the icon, he/she is participating in a lottery, for example. The

5 possibilities are endless.

The push application can also be connected to under-lying UHTTP mechanisms (UHTTP - Unidirectional Hyper-text Transfer Protocol - a simple, robust, one-way resource transfer protocol that is designed to

10 efficiently deliver resource data in a one-way broadcast-only environment). Thus, the push appli-cation uses a protocol with a format comprising e.g. UHTTP or HTTP link information.

The software application running is provided in the

15 receiver but can be downloaded/updated at any time. It can also be a multipurpose application displaying an icon and launching other applications.

An application tuning to a different service opens all elementary streams needed for the new service, i.e.,

20 audio, video and data streams. In case of multiple streams, such as several data streams with different subtitling languages, user preferences stored in the receiver determine which streams to use.

Hence, by using already existing DVB mechanisms,

25 different streams for different languages may be con-structed and the choice of different trigger streams and content may be based on the user preferences.

In case the user wants to deselect the push mechanism, the push application is simply stopped by a simple menu selection.

The push application according to the invention does
5 not interfere with the normal DVB subtitling function as they are transmitted with different PID values. This is a very important aspect of the invention, as the DVB subtitling function per se is not used. In other words, it is not any subtitling information that
10 will be presented to the user. The innovation only uses the transport mechanism and standard methods used by the DVB subtitling in order to deliver the trigger data to the receiver. The monitoring application (mentioned above) receives the trigger information and
15 interpret it accordingly (not as subtitling information).

In the case of an icon, once it is presented to the user, he/she may start a procedure by clicking on it. The procedure can involve displaying the content of
20 the icon.

However, the procedure is not limited to data within the broadcast stream. In the present example, the user equipment is connected to the Internet through e.g. a modem. When the user clicks on the icon, the applica-
25 tion software connects to a specified web site on the Internet. Depending on the icon content, different procedures are initiated. As an example, the proce- dures could involve ordering goods from an Internet vendor. Thus, in case of a bookshop advertisement, a
30 number of icons displaying books are shown. By

clicking on one of the book icons, the book is ordered through the Internet.

A preferred embodiment of the invention has been described. It is realized that it can be varied within

5   the scope of the appended claims. Thus, PTS has been described as the means for determining the presentation time. However, corresponding information, such as Normal Presentation Time (NTP) information can be used as well.

10   A communication system using the DVB standard has been described. It is realized that a non-DVB system can be used as a platform for the push mechanism according to the invention as long as the synchronization features incorporated in the DVB standard are used.